COLONY OF THE GAMBIA.

THE ANNUAL REPORT

OF THE

DEPARTMENT OF AGRICULTURE

FOR THE YEAR 1924.

PRICE 5/-.

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AJB/PHB.

No.Ag.O.168/1925.

AGRICULTURAL HEADQUARTERS,

CAPE SAINT MARY,

THE GAMBIA,

March 30th, 1925.

SIR,

I have the honour to forward herewith for the information of His Excellency the Governor, my report on the work of the Agricultural Department for the year 1924.

I have the honour to be,

Sir,

Your obedient Servant,

ARCHIBALD J. BROOKS,

Director.

THE HONOURABLE,

THE COLONIAL SECRETARY,

BATHURST.

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STAFF OF THE DEPARTMENT OF AGRICULTURE, THE GAMBIA.

Director of Agriculture ...	A. J. Brooks, F.L.S., F.C.S., F.R.H.S.
Assistant Director	C. W. Line, B.A.
Superintendent of Agriculture	J. Pirie, M.M.
Agricultural Assistants ...	E. J. Maurice, O. Waddar and J. Douglas.
Produce Inspector	J. W. Chapman.
Clerk	Vacant.
Interpreter	P. H. Bass.
Assistant Interpreters	S. Dibba and D. Bass.

ANNUAL REPORT

OF THE

DEPARTMENT OF AGRICULTURE, THE GAMBIA,

FOR THE YEAR ENDED 31ST DECEMBER, 1924.

SIR,

I have the honour to submit the first Annual Report of the Agricultural Department.

INTRODUCTORY.

I was offered the appointment as Director of Agriculture in February, 1922, and arrived in the Colony in October. From October, 1922, to April, 1923, I was engaged in trekking throughout the Protectorate to gain knowledge at first hand as to the existing conditions.

In May, 1923, I submitted a report which contained my considered views on the "Agricultural Position and Requirements of the Gambia," and which set out in detail the future programme of the Department.

In July, 1923, I proceeded to England to discuss with eminent authorities on tropical agriculture details of the policy I proposed to follow and to make arrangements for the appointment of staff.

I returned to the Colony in November, 1923, and immediately commenced the work of establishing the Department.

STAFF.

Mr. J. Pirie arrived from Kew on first appointment as Superintendent of Agriculture on January 11th. He was unfortunately invalided home on February 29th, and returned to take up his duties again on July 18th. This break proved a serious handicap to the work of the Department during its initial stages. Captain C. W. Line, B.A., from the Imperial College of Science, arrived on first appointment as Assistant Director on April 4th.

Mr. L. Conteh, who was appointed Interpreter on November 3rd, 1922, was dismissed for insubordination on December 13th, 1923, and was succeeded by Mr. P. H. Bass on December 7th. Mr. Bass has successfully performed the duties of clerk pending the appointment of an officer to that post.

Messrs. E. J. Maurice, O. Waddar, A. Rahman, S. Andrews, G. Edwards, B. Nicol and J. W. Chapman were appointed Produce Inspectors in December, 1923, and continued in these duties until the close of the buying season in May, 1924. They then returned to headquarters and commenced the probationary training for Agricultural Assistants. Messrs. Rahman, Andrews, Edwards and Nicol not having shown sufficient interest in their work, their appointments were terminated in November.

Mr. J. Douglas was appointed, on probation, Agricultural Assistant on October 13th.

Headquarters.

The headquarters of the Department have been established at Cape Saint Mary, in the Kombo district, seven miles from Bathurst.

The situation is most suitable for the purpose, as it provides land which makes it possible—in so far as soil conditions are concerned—to grow crops ranging from citrus to swamp rice.

The present area which comprises less than twenty acres is insufficient for the immediate needs of the Department, and progressive efforts are thereby restricted. As pointed out in my previous report, an area of not less than fifty acres of land must be set aside for the establishment of a properly equipped Agricultural and Botanic Station.

The Assistant Director and Superintendent of Agriculture have been provided with temporary quarters in the Naval Wireless Station, and the Naval Bungalow has been allocated to the Director.

This station being connected to Bathurst by a good motor road, reduces transport difficulties to a minimum, and close communication is maintained with the capital and chief port.

Correspondence and Distribution of Information on Agricultural Matters.

Registered communications numbering 842 were dealt with at the Director's office during the year, including reports on various subjects, and 159 minute papers.

Expenditure.

The votes for the Department of Agriculture for the year under review were as follows :—

	£
Personal emoluments	3,389
Sea passages	450
Transport	450
Miscellaneous requisites	100
Scientific apparatus, meteorological instruments and screens	200
Plants, seeds, fertilizers, chemicals for plant disinfection	400
Labour	800
Technical Library	50
Tools, implements and machinery	200
Total	£6,039

The actual expenditure for the year was £4,833 18s. 3d., being a saving of £1,205 1s. 9d.

AGRICULTURAL AND BOTANICAL STATION, CAPE SAINT MARY.

The work of laying out this station commenced on January 1st, and owing to the short growing period experienced in the Gambia—June to November—all plots had to be prepared and planted within six months.

No trained labourers were available, and for some weeks it was impossible to get a fair day's work out of the casual labour employed. This difficulty, like a good many more, was, however, eventually overcome, and something like sixteen acres of bush land had either been hand-ploughed or forked by the end of June.

Fencing.

The whole area has been enclosed within a permanent wire fence with iron standards and a number of field gates. This was rendered necessary by the constant damage being done by numerous goats and other animals.

Work in the Nurseries and Distribution of Plants.

Nurseries.

Plant nurseries have been laid out and are being stocked with plants of economic or of decorative value as fast as they can be raised from seed forthcoming from various Departments throughout the Empire.

A number of permanent beds, one hundred feet long by six feet wide, were laid out and sown. Owing to the sandy texture of the soil it was found necessary to edge these with concrete to prevent the washing away of the soil during the rains.

Two plant and seed glass-houses, twenty-five feet long by ten feet wide and eight feet high, have been erected for raising special economic plants. A spacious potting shed with iron roof and concrete floor was erected adjacent the glass-houses.

Distribution of Plants.

The following table shows the plants, cuttings, and seeds distributed from the Department's nurseries during the year :—

Plants—	
Economic trees	704
Flowering trees	77
Ornamental shrubs	788
Cuttings—	
Sweet potatoes	825
Seeds—	
Groundnuts, bushels	240
Maize, bushels	24
Giant Pumpkin, packets	18
Vegetable, packets	34

PLANT AND SEED IMPORTATION.

The following are amongst the interesting plants successfully introduced during the year :—

Cassia grandis.
Lagerstrœmia Flos Reginæ.
Chrysophyllum Cainito.
Eucalyptus (12 species).
Albizzia Julil.
Asparagus Sprengeri.
Grevillea robusta.
Thuja gigantea.
Thuja Orientalis.
Hedychium coronarium.
Passiflora edulis.
Casurina torulosa.
Casurina equistifola.
Kniphofia erecta.
Euphorbia pulcherrima.
Stephanotis floribunda.
Bromelia Magdalenæ.
Tecoma spectabilis.
Punica Granatum.
Callistemon speciosum.
Peltophorum ferrugineum.
Pithecolobium Saman.
Castanosermum Australe.
Cupressus macrocarpa.
Furcræa Selloa.
Kniphofia Nelsonii.
Psidium guava.
Jatropha multifidia.
Bougainvillea glabra var. spectabilis.
Bougainvillea glabra var. Sanderiana.
Aristolochia gigas.
A. elegans.
Clerodendron fallax.
Clerodendron fragrans.
Cola vera.

Seed Importations.

Senegal Groundnuts.—Five tons of selected groundnuts were imported from Senegal; two and a half tons from Cayor district and the remainder from Rufisque.

Nigeria Groundnuts.—A small quantity of the "Zaria" variety was imported from Nigeria.

Philippine Groundnuts.—One ton of special seed was imported from the Philippines.

Maize.—Twenty bushels of seed maize was imported from Lagos.

West Indian Lime (Citrus medica, var. acida).—Three hundred pounds of lime seeds were received from Saint Lucia, this island being free from "Wither Tip" disease.

PLOT EXPERIMENTS AT THE AGRICULTURAL AND BOTANICAL STATION.

GROUNDNUTS.

Groundnut Manurial Plots.

A section of land has been divided into ten quarter-acre plots for ascertaining the manurial requirements of the groundnut.

The land was cleared of bush and grass and ploughed to a depth of eight inches.

It is proposed to continue this series for a period of five years before definite conclusions are arrived at.

The manures referred to in the table are to be applied once a year, the method employed being to distribute the manures evenly over the surface and to lightly stir them in.

Seeds were carefully selected and sown singly in rows eighteen inches apart and six inches in the row. Ten and a half pounds of shelled seed were used in each plot. The soil was levelled and not ridged.

Dried Nuts.

Plot.	Yield per acre.		Weight per cwt. bushel.
	lbs.	Bushels.	lbs.
1. Bone Meal	1,770	62	28½
2. Basic Slag, Nitrate of Soda	1,348	48	28
3. Nitrate of Soda, Basic Slag, Sulphate of Potash ...	1,668	54	30½
4. Basic Slag, Sulphate of Potash	1,068	38	28
5. Lime	760	30	25
6. Nitrate of Soda, Sulphate of Potash	1,556	74	24
7. Dried Blood	1,432	59	24
8. Superphosphate	1,013	41	24
9. Basic Slag	1,332	49	27
10. No Manure	1,364	56	24

The yield per acre varies according to the variety, the climate, and the treatment the crop receives.

A survey of the foregoing results shows that good yields were obtained, and these varied with the manures applied.

Plot 5 has strikingly demonstrated that well-known fact that the application of lime to a soil deficient in humus is detrimental. Slaked lime was used and the quantity applied in this instance was at the rate of one ton per acre.

The soils of the Gambia are very deficient in humus, due chiefly to the frequent burning of the surface.

I am of the opinion that bone meal and basic slag will prove valuable manures for general application in the Gambia.

It is unwise to generalise under a period of five years. These plots will therefore be allowed to remain fallow until next planting season, when they will be resown with groundnuts and receive the same treatment each year. The groundnut grass produced in each plot has been returned to the soil to increase the humus content.

Variety Trial Plots.

"*Zaria.*"—This variety had given good yields in Nigeria, and a small quantity of seed was obtained from the Department of Agriculture, Nigeria, for trial in the Gambia. The seed was only sufficient to plant seventy square yards, and this produced 53 lbs. of dried nuts of good quality. The land received generous cultivation and an application of potash, phosphate and nitrogen.

The plants grew vigorously and were particularly free from disease. Special attention will be paid to this variety during the coming season, as it appears from its general habit to be a very promising variety for the Gambia.

The results of an examination of these nuts conducted at the Imperial Institute appear in Table I. at the end of this section.

Philippine Red.—This variety produces a long pod of good colour containing three to four kernels, with a bright red skin. It made strong growth and suffered little damage when attacked by the groundnut fungus. Three distinct varieties were isolated from the seed produced, the original red three-kernel variety, a large white seeded variety bearing two kernels, and a bright flesh-coloured two-kernel nut. In both instances the "white" and the "pink" nuts were much larger and fuller than the original parent seed.

See Table I. for technical report of the red and pink varieties. Sufficient seed of the white variety could not be spared for analysis.

"*Dixie Giant.*"—A small plot of this American variety was grown for experimental purposes from seed obtained in the Protectorate. This is a large two-seeded variety low in oil content and used chiefly as a confectionery nut. It is therefore of little value so far as the local groundnut industry is concerned. It gave a yield of 1,716 lbs. per acre and a cwt. bushel weighed only 20 lbs.

"*Senegal.*"—Special selected seed-nuts were obtained from Cayor and Rufisque (Senegal). A two-acre plot was carefully prepared and planted with this seed. This variety is not a vigorous grower under Gambian conditions and takes much longer to cover in, thus necessitating two extra weedings. The nuts produced were of good quality and weighed 28 lbs. to the bushel, but the yield was disappointing and much below that of the local variety. The actual yield obtained from this plot was 2,241 lbs., or 1,120½ lbs. dried nuts per acre. Forty bushels were obtained per acre.

"*Gambia.*"—This seed was obtained from the previous local crop and fairly represented seed from the various Provinces of the Protectorate.

Three plots of one acre each were laid out adjoining the Senegal plots, and the preparation of land and cultivation was the same in all cases.

Acre 1 produced 2,055 lbs. of dried nuts weighing 27 lbs. per bushel.
„ 2 „ 1,676 „ „ „ 27½ „
„ 3 „ 1,779 „ „ „ 27½ „

This was an average actual yield of 1,836 lbs. per acre and a gain over the Senegal variety of 716 lbs. per acre.

"*White.*"—This variety, which was isolated from seed received from the Philippines, grew vigorously and soon covered the ground. The seed produced was very heavy and full, and yielded at the rate of 2,721 lbs. per acre.

This variety is regarded as one of the best strains raised at the Station during the year.

"*Pink.*"—This variety was also isolated from Philippine seed and proved a strong grower and showed marked resistance to disease. It produced a heavy, full nut with a delicate flesh-coloured skin. It yielded at the rate of 1,932 lbs. per acre, and upon examination at the Imperial Institute was found to contain 51·1 per cent. of oil, 74 per cent. kernel, and 0·29 per cent. free fatty acid, thus proving it to be a particularly fine variety for seed purposes.

Special attention is being paid to the "pink" and "white" varieties, with a view to propagating in sufficient quantities for general distribution.

"*Basse.*"—This variety was the ordinary Gambia nut grown at Basse in the Upper River Province, and when visiting this district, in 1922, I obtained a quantity of this seed from the Travelling Commissioner, which I carefully selected and returned to him for sowing in 1923, as this Department was not then established.

Early in 1924, he returned to me the crop raised from this seed, and after further careful selection it was sown in trial plots at this station.

It proved a strong grower and a prolific bearer, producing 2,832 lbs. of dried nuts per acre, or 1,712 lbs. per acre in excess of the specially selected Senegal seed from Cayor.

From the following table it will be seen that it gave 78 per cent. kernel, 51·8 per cent. of oil, and free fatty acid of 0·49 per cent.

This has proved a most desirable variety for general distribution, and is being propagated as fast as possible.

Eight samples of the nuts grown at the Agricultural Station were forwarded to the Imperial Institute for examination, and the following report was received :—

TABLE I.

Variety	Husks in nuts.	Kernels in nuts.	Moisture in kernels.	Oil in kernels as received.	Oil in moisture free kernels.	Acid* value of oil.	Free Fatty Acid.
A—Red Philippine	35	65	6·3	46·5	49·6	0·75	0·38
B—Pink	26	74	6·3	47·9	51·1	0·58	0·29
C—Senegal (Manured)	25	75	6·4	48·2	51·5	0·65	0·33
D—Senegal	26	74	6·6	47·6	51·0	0·73	0·37
E—Senegal (No Manure) ...	26	74	6·3	48·0	51·2	0·71	0·36
F—Basse (Gambia)	22	78	6·3	48·5	51·8	0·98	0·49
G. Zaria (Nigeria)	22	78	6·2	47·9	51·1	2·86	1·44
H. Gambia (Ordinary)	25	75	6·0	45·7	48·6	1·12	0·56

* Expressed as oleic acid per cent.

TABLE II.

GROUNDNUT VARIETY PLOTS, SHOWING YIELDS.

Variety.	Actual Yield Obtained in lbs.	Yield per Acre. Lbs.
Gambian Varieties :—		
Basse	2,832	2,832
Gambia No. 1	2,055	2,055
Gambia No. 2	1,676	1,676
Gambia No. 3	1,779	1,779
Senegal Varieties :—		
Cayor	2,241	1,120½
Rufisque	1,002	1,002
Philippine Varieties :—		
Red	636	1,272
Pink	483	1,932
White	103	2,721
American Variety :—		
Dixie Giant	143	1,716

WORK CONNECTED WITH INSECT AND FUNGUS PESTS AND THEIR CONTROL.

GROUNDNUT.

Leaf Spot. *Cercospora personata. Ellis.*

This disease is common throughout the groundnut farms, and caused appreciable damage to the 1923-24 crop, when a large percentage of the nuts were found to be shrivelled. The disease usually appears about six weeks after the germination, and the older leaves nearest the soil are the first to be attacked. The infected leaves break out in an eruption of dark brown spots, which later become surrounded with a bright yellow ring. As the disease develops the leaves are shed, and this partial defoliation seriously interferes with the normal functions of the plant, preventing the development of the nuts and causing premature ripening of the haulms. In slight attacks, when the plants are being grown in congenial surroundings and growth is vigorous enough to make good this loss of leaves, little or no damage is done to the crop. When, however, groundnuts are grown in swampy land, or land subject to frequent flooding, considerable damage is caused by this disease.

Treatment.—Spraying with Bordeaux and similar mixtures have not proved satisfactory either in Africa, India or the West Indies. Some control over this disease was obtained by the writer when conducting experiments in Dominica by dusting the plants with sulphur in the late evening after dew had fallen and the leaves had closed, thus exposing their under surfaces.

This treatment would hardly be profitable, however, over extensive areas after the disease had got a firm hold, but may be recommended for use in more or less isolated areas during the early stages of the outbreak.

It would appear from observations and trials made by this Department that the effects of this disease are best controlled by growing a variety capable of producing the maximum amount of foliage, and by the avoidance of uncongenial conditions, such as heavy or swampy land. Where the soil is inclined to be excessively moist, the nuts should be sown on ridges, and not on the flat.

Groundnut Wilt.—A disease of groundnuts similar in its action to wilt disease has been observed in isolated patches here and there throughout the Protectorate, but in most instances only a few plants were attacked. A severe outbreak of this disease, however, occurred in one of the field plots at the Agricultural station, and this enabled special observations to be made of its action and development.

A few plants here and there were first noticed to have a scorched appearance, which gradually developed, until the whole plant eventually dried up.

Spraying with Bordeaux mixture had no apparent effect in controlling the disease, which continued to spread slowly until areas several yards in circumference had been devastated. Every plant within the affected areas was completely destroyed by the disease.

After the disease had been permitted to extend until the action of the Bordeaux mixture had been determined, the affected plants, together with a number of healthy ones nearest the infected margin, were rooted up and burned within the diseased areas. No further spread of the disease occurred, but this may in part have been due to the natural ripening of the remaining crop, which by this time was rapidly maturing.

In view of the fact that a *fusarium* was successfully isolated by the Assistant Director both from the root and vine of an affected plant, it may be concluded that the disease is caused by a fungus of the fusarium group.

It is interesting to record that, upon investigation, it was ascertained that for many years previous, groundnuts grown in this land had been partially destroyed by disease.

Root Disease.—One case of root disease, probably due to *Sclerotium Rolfsii Sacc.*, was observed by the writer in the Upper River Province. The affected plants showed marked signs of wilting, and upon examination, the stem at soil level was found rotting and covered with a white mycelium.

This disease is rare in the Gambia, and may be avoided by paying attention to the efficient drainage of the soil.

When plants are found suffering from this disease, they should be promptly rooted up and burned within the infected area, and the land for some time should be allowed to fallow or planted with crops other than groundnuts.

Rust Disease.—No evidence of the existence of rust disease (*Uredo arachidis*) was obtained during the year.

Corn.

Basso or "Leo Disease."—The Basso, or Guinea corn crop, suffers severe damage each year from the ravages of a small green fly, *Aphis sorghi.* In many localities, particularly in the North Bank Province, this pest has proved so troublesome that the cultivation of this useful food crop has been entirely abandoned. The ravages of this pest were apparently first notice about ten years ago, and became known locally as "Honey disease," due to the excretions of the insects, which, falling on the leaves below, covered them with a sticky deposit and gave them the appearance of having been coated with honey. Bees and ants are attracted by this deposit, and their appearance is often the first indication of the pest.

A few affected areas were kept under observation by the writer during the growing and ripening period, and a number of grubs which appeared to be feeding on the aphids were collected and bred out.

Specimens of the insects obtained were forwarded to the Imperial Bureau of Entomology for identification.

These were identified as *Paragus borbonicus, Medq.* and *Xanthogramma pfeifferi, Bigot.*

In forwarding these determinations, Dr. Guy Marshall very kindly supplied the following interesting information :—" With regard to the ravages of *Aphis sorghi*, in past years this insect has done a great deal of damage in the Sudan, and a short time ago I enquired of Mr. H. H. King, the Government Entomologist there, what measures he had found successful in dealing with them. He told me that they had been unable to devise anything that appeared really practicable, and when they were just beginning to make a serious investigation into the methods for dealing with the pest, it suddenly disappeared, and they have not been troubled with it since. He is of opinion that the insect probably occurs in cycles, and he proposes to start investigations on it before very long in anticipation of another cycle arising.

" In the French Sudan, the recommendations made are that all the old stools of sorghum should be dug up and burned immediately after the harvest. (The aphids hibernate on the roots.)

" Plantations which have remained unproductive, and consequently unharvested, should be dealt with at an earlier date. Where sorghum is very badly attacked, it should be replaced by the small millet (*Pennisetum spicatum*). Land shaded by trees with dense foliage (*Ficus, Cola cordifolia, Parkia*, tamarind, etc.) should not be sown with sorghum, as no good crop will be produced, and the stems neglected by the cultivator will prove a breeding place for aphids, unless the district is one of those where stubble destruction is compulsory.

" They have also derived a certain amount of benefit from the fact that the numerous enemies of *A. sorghi* also feed on an aphid, which is abundant on another plant (*Leptadenia*). This aphid never attacks sorghum, and *Leptadenia* plants are therefore allowed to grow at intervals among millet crops, to encourage the natural enemies of the aphid. If the *Leptadenia* is readily available in the Gambia, it might be worth your while making a small experiment with it to see if this method would be of any practical value in your case."

Treatment.—The above recommendations are likely to be of practical value in controlling this pest in the Gambia, and can be readily followed by every native farmer. In localities where the Basso crop has repeatedly failed, its cultivation should be discontinued for the present in favour of Suno Sānyo and Mājo or Tubab Nyo.

The roots of all corn should be dug out and burned as soon as the crop has been harvested.

Rust (*Puccinia purpurea. Cke.*).—This disease is common on sorghums throughout the Protectorate, but does not appear to cause appreciable injury to the crop. The affected leaves assume a purplish-red appearance, caused by the fungus producing a number of pustles containing spores, which eventually infect other plants. Two kinds of spores are produced, one which spreads immediate infection, and another which is capable of remaining dormant in the soil for long periods, and thereby infecting the following crop.

All affected plants and old stools should be burned.

" *Silo" Disease.*—At many of the meetings held in the Protectorate, farmers have frequently complained of the damage to corn crops caused by " Silo " disease. Upon investigation, it was found that the trouble was not caused by a disease, but was due to the action of a weed called " Silo " (*Striga macrantha Benth*), which appears to thrive vigorously on poor and partially worn-out land.

Casual attempts are sometimes made to destroy this weed by cutting it down at soil level, but this only results in the plant springing up again in a more vigorous and destructive form.

A little energy exerted by the farmer in removing the roots of this weed would very effectively remove all cause for complaint so far as "Silo" disease is concerned.

Citrus.

Lime and orange trees are to be found growing vigorously throughout the Protectorate under what might be termed semi-wild conditions.

In view of the prolonged annual droughts experienced in the Gambia, it is a matter of considerable surprise that these trees should remain so free from the serious ravages of scale insects and other pests.

It was not expected that the various parasitical fungi which control some of the citrus scale pests in the West Indies would be found in the comparatively dry climate of the Gambia, but observations were made to ascertain, if possible, what factors were concerned in controlling the few scale insects present.

In every case observed, a number of ant nests were found in each tree, the ant being the same as that more commonly found in mango trees. Careful observation was kept, and it was found that these ants were actively feeding on the scales daily between 6 a.m. and 8 a.m. and again between 4 p.m. and sunset.

Specimens of these ants were collected and forwarded to the Imperial Bureau of Entomology for identification, and Dr. Marshall reported as follows :—

"This species proves to be *Oecophylla smaragdina. F.* At one time this insect was regarded as beneficial in Java, but further investigations have shown that in the coffee plantations it certainly protects some of the Scale insects, such as the Green Scale, by destroying its natural enemies.

"It is also a considerable nuisance owing to the bites it inflicts on the natives at harvest time. In Nigeria it has been stated to drive away certain cacao pests, but to protect the Scale insects. It is possible that it may only attack Scale insects in the absence of other more suitable food, and I shall be much interested to learn of any further observations that you may make on the habits of the species. It is a widely distributed insect, occurring throughout the whole of the tropics of the Old World from West Africa to Queensland."

Further observations tend to confirm the opinion that these ants feed upon the Scales, as, upon examination, many were found to be punctured.

Scale Insects.—A number of Scale insects on citrus were collected, and identified by the Imperial Bureau of Entomology as follows :—

Rhynchota.

Coccidæ.

Pinnaspis minor. Mask.
Parlatoria zizyphus. Lucas.
Lepidosaphes beckii. Newm.
Coccus hesperidus. L.
Pseudaonidia trilobitiformis. Green.

Miscellaneous Insects.

Grasshopper.—A large variegated grasshopper proved particularly destructive to the foliage of various cereals and seedling casurinas. Specimens collected and forwarded to the Imperial Bureau of Entomology were identified as *Zonocerus variegatus, L.*

Control.—The most effective control is to collect and destroy the insects. Poison bait, which is satisfactory in controlling this pest in some countries, cannot be recommended for use in the Gambia.

Velvet Mite.—A number of these beautiful insects were collected and identified as *Trombidium grandissimum, F.* In forwarding the identification, Dr. Marshall reported that these mites were not injurious to vegetation, but preyed upon all sorts of minute insects and other mites.

Hibiscus Beetle.—Nursery beds of hibiscus suffered severely from the attacks of two species of a small beetle, *Nisotra dilecta Dalm.* and *Nisotra uniforma, Jac.*

Arsenical spray proved effective in controlling this pest.

Silver-Fish.—This insect has become thoroughly established in several of the business premises in Bathurst. It is responsible for considerable damage to general merchandise, particularly woollen, silk and cotton goods.

So serious is the infestation, that it has been necessary, when building new premises in the vicinity, to construct deep concrete channels for holding water, so that the new building can be isolated by water from the infested area.

The assistance of this Department was sought by one of the firms concerned, and experiments were conducted to ascertain suitable means of control.

Some idea of the degree of infestation may be formed from the fact that when the doors of the buildings are opened the insects literally rain down from the roof. The writer made an actual count of 234 adult insects to a measured square foot of wall. This was not an exceptional patch, but fairly represented the infestation of the remaining walls, floor and roof space. This particular building was of a cubic capacity of 9,909 feet.

Fumigation experiments were carried out in two separate buildings, " The XL All Solid Cake Compound," and hydrocyanic acid gas being the fumigants employed.

The strength used was twice that recommended for general use when fumigating plants, as considerable difficulty was experienced in making the building approximately air tight.

The buildings were opened up about 48 hours after fumigation. The floor and every article in the buildings was thickly covered with dead silver-fish. A square yard of floor space was carefully measured off, and 10,122 dead insects were collected from it. A large number of live silver-fish were still running over the walls, but it is probable that these entered from adjoining buildings after the fumigants had dispersed.

From the results of these experiments, it would appear that this pest could be effectively brought under economic control by the weekly fumigation of the infected premises with the " XL All Solid Cake Compound " fumigant.

Such fumigation is safe and simple to use, and is comparatively inexpensive. It is essential, however, that *all* the infested buildings should be treated at the same time, and I would strongly recommend a bi-weekly treatment for the first month, followed by a weekly fumigation as long as was necessary.

General Recommendations.

The usual methods of controlling plant diseases and pests by poisonous sprays, washes, and pastes, cannot be recommended, or followed, when dealing with native farmers.

For the present, attention must be confined to the general improvement of soil conditions, with a view to inducing vigorous growth, and thus develop a greater resistance on the part of the plant to withstand disease and the ravages of insect pests.

Generous cultivation and rotation of crops should be urged, and direct control by rooting up and burning all affected plants as soon as observed, will go a very long way towards reducing the heavy annual loss in food crops which now occurs.

Injurious insects, such as grasshoppers, beetles and weevils, should be collected by hand and destroyed. This could easily be undertaken by the numerous children who at present appear to take little or no active part in the development of the farm.

Special attention is directed to the advisability of burning all corn stalks and stools *immediately* after reaping the crop, as these harbour fungus and insect pests and thus become infecting centres.

Plant Legislation.

An Ordinance to provide for the prevention and eradication of Diseases and Pests affecting vegetation.

The Plants Protection Ordinance, No. 18, of 1924, became operative on December 31, thus bringing this Colony into line with other progressive parts of Empire.

Under this Ordinance, all plants and seeds imported into this Colony are delivered by the Customs authorities to the Director of Agriculture, who inspects them and disinfects them in such manner as he deems adequate.

If plants, upon arrival, be considered to be infected with any pest or disease that may be a source of grave danger to the Colony, he may destroy the plants.

Should there be suspicious circumstances as regards pests or diseases, he may require that the plants be planted in some safe place where he may inspect them from time to time, and take such steps as he thinks fit to control any pest or disease that may be present.

The Government has the power to prohibit the importation of any particular plant from any country where a dangerous disease or pest occurs in connection with the plant; such a course is taken in regard to :—

> Maize or maize straw having come either directly or indirectly from the Gold Coast Colony or from Ashanti, West Indies, or the United States of America.

Object.—To prevent the introduction into the Colony of the "Corn Smut disease" (*Ustilago Maydis*).

Fumigatorium.

A suitable building, made of concrete blocks, provided with a chemical store and fumigation chamber, has been erected at the Agricultural Station by the Public Works Department.

The chamber, which is of a cubic capacity of 580 feet, enables all importation of plants and seeds to be dealt with effectively.

The chemical store supplies, for the present, the necessary accommodation for carrying out chemical investigations.

GENERAL AGRICULTURAL CONDITIONS.

Agricultural conditions in the Gambia differ mainly from those of other African colonies, owing to the absence of hinterland. There are no high lands nor interior lands awaiting development.

The whole territory consists of nothing more or less than a narrow strip of low-lying land following the river along its course on either bank for a distance of nearly three hundred miles, and extending inland to an average depth of about seven and a half miles. The total area being approximately 4,000 square miles, with a population of 210,530.

The climate, both as regards rainfall, humidity and temperature, does not show sufficient variation between the separate Provinces to render possible the cultivation of different crops.

Generally speaking, the labour is extremely poor and falls much below that of neighbouring colonies. It is also to a large extent migratory. Large numbers of immigrant farmers enter the Gambia from adjoining countries to plant groundnuts, and upon their presence and energy depends to a very great extent the material prosperity of the Colony.

The dry season often occupies seven months in the year, and this drought is general throughout the territory. The soil is of a light, sandy nature, and from June to October suffers from a deficiency, and a diurnal variation of temperature of 40° is not uncommon.

Land ownership is hereditary. Where land is not held or claimed by a native, it can be rented from the Government for various periods, but freehold rights are not given. The land belongs to the people, and each farmer is really the owner as long as he continues to cultivate it.

Forests are non-existent. It is also a matter of much regret that, unlike many of our more progressive colonies, there are no European plantations. Such plantations in other parts of the Empire have a tremendous influence upon the agricultural education of the native farmer. In a measure they fulfil the functions of an agricultural training centre, demonstrating the most profitable crops to be grown, the most up-to-date methods of cultivation, and the best manures to apply. They stimulate industry, promote trade, and circulate money, in addition to creating confidence.

Such conditions call for the greatest exercise of optimism on the part of the agriculturist, if these natural difficulties are to be successfully overcome. No spectacular rise in trade and exports can be accomplished under such conditions, and should not be expected, but a steady and sure advance along progressive lines can be made with patience, fortitude and perseverance. The first step forward being towards improvement in *quality* and then the directing of all effort towards increasing the output.

Continuity of policy must be the controlling factor in the presence of such natural obstacles if the intense conservatism of the native cultivator is to be broken down.

Crops.—The chief crops grown are groundnuts, rice, maize, Guinea corn (Basso and Kinto), and various kinds of millet (Sannio), sweet potatoes, cassava, and several varieties of peas and beans.

Cultivation.—The agricultural labourers work for about four months in the year—during the rains, from July to October—and rest for eight. During this short working period the women grow rice, and the corn and groundnuts are grown by the men. The supply of native rice is never equal to the local consumption, and rice to the value of £126,982 was imported during the year to meet this deficiency. Groundnuts are grown for export, and from this source money is obtained for the purchase of cattle, cottons,

luxuries, and jewellery, such as silver anklets and bracelets for the women folk.

Agricultural Population.

The population is insufficient for the needs of the country, being only an average of fifty-one to the square mile. The Protectorate is divided into the following Provinces :—

Name.	Area in square mile.
North Bank	813·8
South Bank	925·0
MacCarthy Island	565·9
Upper River	703·8
*Kombo and Fogni	990·1

The North Bank Province is the must densely populated, being 77 to the square mile, and the Kombo and Fogni is the most sparsely populated, with only 35 to the square mile.

This population is unevenly distributed, and stretches of country several miles in extent are to be found without any sign of habitation. In other areas several villages are grouped together within a quarter of a mile of each other.

The following comparative table is of interest, showing, as it does, the vast difference in the density of the population of other agricultural countries. Particular attention is directed to Jamaica, a West Indian colony of approximately the same area as the Gambia, which supports a population of 203 to the square mile, as compared with 51 in the Gambia. The figures referring to Barbados show that where intensive methods of cultivation are practised, and the people are willing to work, a population of 1,195 to the square mile can be supported.

	Area. Square miles.	Total Population.	Population per square mile.
Gambia	4,003	210,530	51
Jamaica	4,207	858,118	203
Grenada	120	59,864	493·3
Barbados	166	198,000	1,195

From the foregoing, it will be seen that there is ample room for more workers, and this brings me to the all important question of the strange farmer.

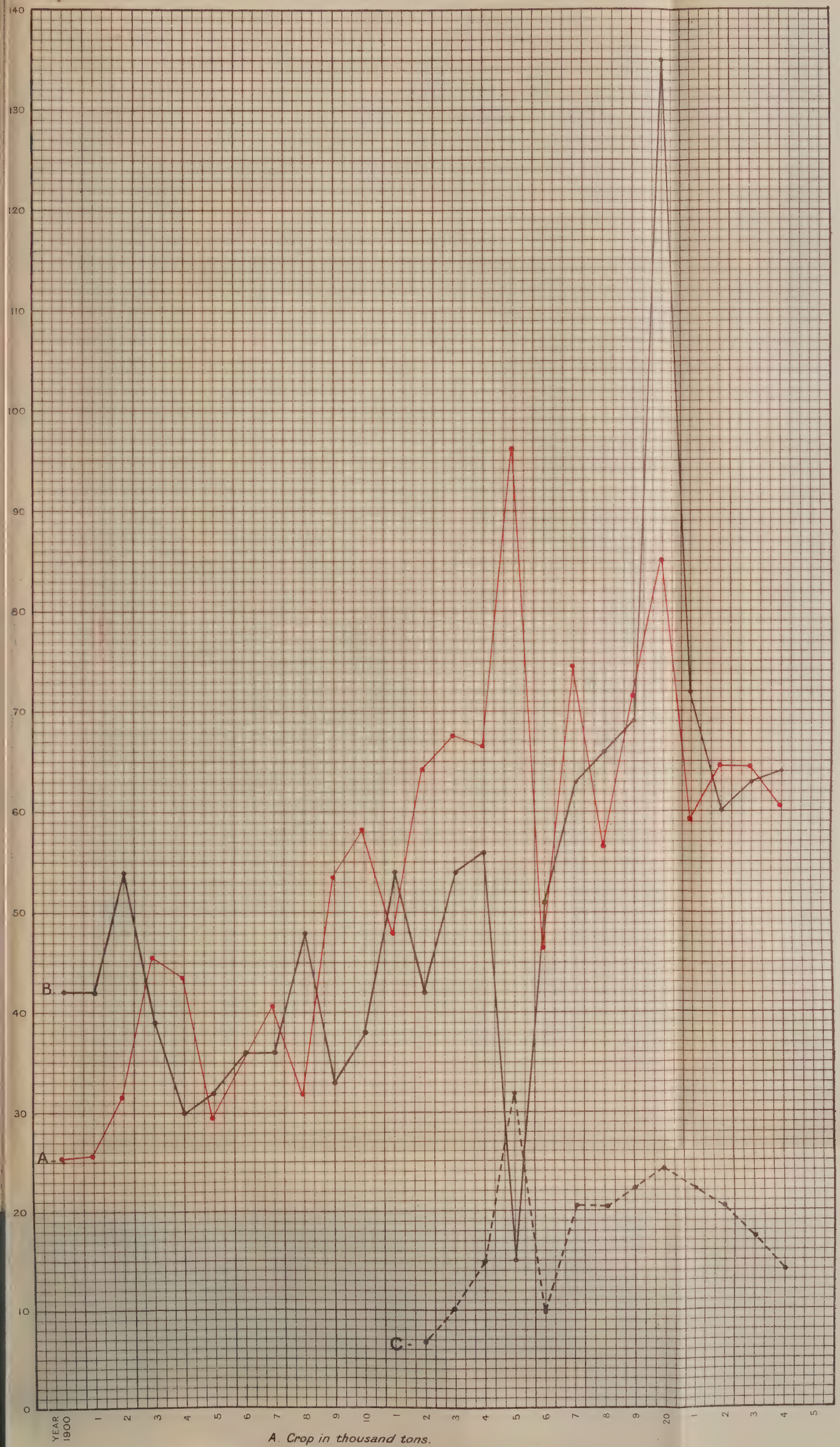
Strange Farmers.

In my report for 1923, I drew special attention to the economic importance of the immigrant farmers who come into the Gambia each year from neighbouring countries to grow groundnuts. Their importance can hardly be over-estimated, as there is not the slightest doubt that upon the labours of these farmers depend in no uncertain measure the material prosperity of the Gambia. Their presence make all the difference between a good or bad year, both in respect to the crop of groundnuts grown, and to the general trade in cotton piece goods. It is upon the sales of cotton piece goods rather than upon the groundnuts grown, that the trade of the Colony depends.

The local price paid for groundnuts is not the sole determining factor in this economic problem. In Chart I is shown the average prices paid for groundnuts over a period of twenty-five years, together with the total export of groundnuts, and the number of strange farmers entering the Colony during those years. This chart is of particular interest, as it clearly

* Excluding St. Mary's Island, which is 4·4 square miles.

CHART I. — SHOWING PRICES PAID FOR GROUNDNUTS. ANNUAL CROP AND NUMBER OF STRANGE FARMERS. FOR THE YEARS 1900–1924.



A. Crop in thousand tons.
B. Price at shipping ports, cents per bushel of 28 lbs.
C. Number of immigrant farmers.

demonstrates the effect of price upon the immigrant farmer and his effect upon the crop.

In 1914 the price paid for groundnuts was 2s. 1d. per bushel of 28 lbs., at wharf towns, and 2s. 4d. at shipping centres. This was the highest price ever paid in the Colony for groundnuts up to that year, and resulted in no less than 32,220 strange farmers coming into the Colony the following groundnut season (1915), this being an increase of 27,312 on the previous year. The crop increased from 66,885 tons to 96,151—a net increase of 29,266 tons in the one year.

This was, and still remains, the record output for the Gambia, but unfortunately it also proved a record year in respect to the price paid for groundnuts, the prices realised being 4½d. and 7½d. per bushel. This caused a falling off of 22,905 strange farmers the following season, with a resultant drop in crop of 49,785 tons, representing a local value of £547,646.

From then until the year 1919 the local price paid appears to have governed the situation; but from 1920 this ceased to be the dominating factor, and a steady decline then set in and has continued to date.

The extraordinary rise in price which occurred in 1920, when it rose from 2s. 10½d. to 5s. 6d. per bushel—and for a short period to 8s.—had no stimulating effect whatever upon their numbers; indeed, the rise in price was actually followed by a decrease, and this decline has continued to date.

It is therefore evident that other factors are now seriously affecting the situation, and every effort should be made to ascertain and remove all influence which tends to discourage the immigrant farmer.

From a careful survey of the figures submitted, and from actual field observation, I am of the opinion that we shall not be over-estimating the average output of each strange farmer if we place it at one ton per man. This requires from one and a half to two acres of land, according to locality, character of soil, and method of working.

When it is fully realised by all concerned that each strange farmer represents one ton of nuts, apart from his other economic value as a spending unit, I think greater encouragement will be extended to him, and he may no longer be regarded as an undesirable coming into the Colony to take money out of the country.

It may not be politic to offer special inducements to attract immigrant farmers from neighbouring territories, but, on the other hand, nothing should be done which tends to drive him away, or is calculated to show him that he is not wanted.

The welcome accorded the strange farmer is not, perhaps, as cordial as it might be. A tax of 4s. is at the outset levied upon him, and he is usually given the worst land to clean and plant, so that it may be in a better condition for the land owner to plant his corn later on. Seed and food is usually provided, but in return for this he is expected to hand over a portion of his crop to his landlord.

I do not think that there is any one specific cause for this decline in strange farmers, but there is not the slightest doubt but that there are a number of irritating causes which, combined, have produced this unsatisfactory result.

It is a significant fact that the introduction of Produce Inspectors coincided with the commencement of this decline, and I concur with the views expressed by some of the Travelling Commissioners that the inspectors were one of the primary causes of it. The farmers suffered considerably by this system of inspection, which was nothing less than open persecution, and after watching its effect for two seasons, I condemned it as unsound and unworkable.

Produce inspection came into operation in 1920; the decline in the number of strange farmers is as follows :—

Year.	Number of strange farmers.	Decrease in number.
1920	24,150	—
1921	22,058	2,092
1922	20,566	1,492
1923	17,383	3,183
1924	14,188	3,195

Any system which enabled farmers to be stopped on their way to market and compelled then to unload their donkeys by the wayside, so that their produce might be inspected, was calculated to dishearten the most industrious farmer. Experience proved that it was not the farmers who were the chief offenders in the adulteration of produce, but their less industrious neighbours—the native traders.

This class thrived exceedingly by the simple process of making up any shortage in tonnage by the addition of sand, for which the farmer was invariably and unjustly blamed.

This practice has become such a habit with certain traders that even now, with compulsory screening at the time of purchase, nuts are being received from some native traders at the transit stations adulterated with a high percentage of sand. Quite recently a cutter arrived at Kuntaur from Bansang containing a cargo of groundnuts adulterated with sand to 4·24 per cent. This adulteration was deliberate on the part of the native trader, and was added after the produce had been screened.

Such traders cause incalculable harm to the Colony; not only do they rob their employers of thousands of pounds, but they ruin the trade of the country and discourage the honest grower.

While every effort is being made by this Department to encourage the native inhabitants to increase their output, we have to face the fact which common experience proves, that no matter how attractive a price may be a native farmer will not increase his production much beyond the degree of actual necessity. This has been realised in other countries, where increased value of agricultural produce has had the effect of actually reducing the area under cultivation, as it became possible for the native to reap with *less labour* the actual money he required. Careful observations at such times invariably show that any increase in production is largely dependent upon the efforts of others, who, having been attracted by the more remunerative prices, take up the cultivation of new areas, rather than to the extra effort on the part of the regular farmer.

It is the ambition of the landlord to get as many strange farmers as possible. The more strange farmers he has, the less work he does himself.

The average native is not bent on amassing wealth, but is chiefly concerned in obtaining his necessities with the least possible effort and expenditure of energy. This mental attitude was strikingly illustrated recently, when the writer was conducting a party of farmers over the Agricultural Station. The Headman expressed his pleasure at all he had seen, but added, "you savvy farm plenty, but *too much work*." This is the stone wall which faces the agriculturist in Africa, and particularly in the Gambia, where the main work has for years been done by immigrant farmers.

Groundnuts are grown to the exclusion of other crops, solely because they require less effort than other crops, and yield a good profit for the labour expended.

The climate and soil of the Gambia is capable of producing other crops, but as their successful cultivation demands greater effort than groundnuts, it is unlikely that any serious attention will be devoted to them for some time.

Rice and Seed Debt.

It is very probable that the repayment of the debt for rice and seed has had a more depressing effect upon the immigrant farmers than any other cause.

It was the practice of the Government for some years to issue rice and groundnut seed to the farmers each year.

In 1921 the debt for this service was £67,237. It is significant that the repayment of this debt has declined with the number of strange farmers, as shown below :—

Year.	Number of strange farmers.	Total Debt. December 31.	Reduction of Debt.
		£	£
1921	22,058	67,237	—
1922	20,566	55,906	11,331
1923	17,383	43,490	12,406
1924	14,188	38,760	4,730

The repayment of this debt has proved a severe task, and the willing worker has had to bear the brunt of it, while the idler has escaped. So long as any part of this debt remains to be paid, we may not expect a return to normal in the number of strange farmers.

The strange farmer is the milch cow of the Colony, and he is being milked dry.

If the balance of this debt could be written off at once, and the fact made known, we should probably see a steady return of immigrant farmers and a corresponding increase in trade.

In view of the fact that each strange farmer indirectly, through his labour, contributes 20s. in export tax to the revenue of the Colony, it would be a sound business proposition to refrain from taxing him upon his arrival.

While this practice of issuing rice and seed may have been of some temporary assistance at the time, it has certainly had a marked pauperising effect upon the agricultural community as a whole, and has led the natives to look to the Government to be fed, instead of depending upon their own efforts.

Shortage of Food Crops.

Shortage of food crops in the Gambia is not due to unforeseen circumstances or uncontrollable natural conditions. *It is solely due to the fact that the area planted is insufficient for local requirements.*

So long as the native understands that he will receive rice from the Government when his food crops are finished, so long will he refrain from planting sufficient for his needs.

The large Guinea corn (Basso) is the only crop which is seriously affected by insect pests in certain districts, and this crop fails year after year from the same cause. Farmers should be discouraged by their chiefs in planting this crop—which is so uncertain—when the red kinto seldom ever fails. In food value the red kinto is equal to the Basso, but is not quite as large in grain.

Until farmers are definitely informed that no rice will be issued in future except in dire necessity, caused by uncontrollable natural causes, we may always expect an annual recurrence of this shortage. Land that is used for only four or five months of the year does not require resting for the whole of the following year, as is often the custom at present. This is but a further excuse for general laziness.

EFFORTS MADE TO IMPROVE THE QUALITY OF THE GAMBIA GROUNDNUTS.

Seed Selection.

At all the meetings held in the Protectorate by the Agricultural Officers, the importance of seed selection at the time of sowing was emphasised and demonstrated. This propaganda commenced in 1923, when the Director of Agriculture held thirty-three meetings in the Protectorate, and addressed 13,702 native farmers on the subject.

He again dealt with this subject when touring the Upper River and MacCarthy Island Provinces in March for the purpose of inspecting the native seed supplies.

The Assistant Director made two tours in the Protectorate, from April 23 to May 26, and from June 18 to August 19. Sixty meetings were held, and the importance of seed selection was again explained. From the numerous surprise inspections made by the agricultural officers during actual sowing operations, there was ample evidence of the care which had been exercised in the selection of seed by the native farmers.

Raised Platforms.

During reaping operations, farmers were urged to extend the practice of stacking their unbeaten nuts upon raised platforms to prevent the development of moulds, which blacken the shell and spoil the appearance of the nuts.

From actual experiment, it was determined that lying on moist soil for twenty-four hours was quite sufficient to spoil the appearance of the nuts. Many more platforms were erected than in previous years, but the Mandingo farmer still falls far below the Jolah in his effort to produce good nuts. Where material for making platforms is scarce, a drain should be dug around the stack. Platforms are, however, much more effective, and in time should become compulsory.

Produce Inspection.

For some years past the quality of the groundnuts grown in the Gambia has left much to be desired, and constant complaints were made by European buyers to the effect that the nuts were fast becoming unsaleable. Not only were they poor in quality, but in many instances were deliberately adulterated with sand, ironstone and sticks to make up weight.

Records show that in 1915 this adulteration reached 17·53 per cent., the average being 4·55 per cent. In 1916, 10·46 per cent. was recorded, with an average of 4·66 per cent. In 1923 adulteration varied from 6 to 11 per cent., and one European buying house wrote that to ship such produce required a certain amount of audacity on the part of the shipper.

The ruinous competition among traders was alone responsible for this adulteration. The nuts were purchased without previous inspection, and farmers or traders can hardly be blamed for taking advantage of such

Native farmers selling their groundnuts at a depot.

Loading a steamer with groundnuts.

unbusinesslike methods. They saw their opportunity for making good any apparent shortage in their tonnage by the addition of sand.

Merchants explained that they had not the time to inspect the produce when buying, and feared they would lose trade if they did so, as some merchants would continue to buy without inspection.

In 1920 "The Adulteration of Produce Ordinance" was brought into force. Under this Ordinance a number of native Inspectors were appointed who had power to stop and examine all groundnuts intended for export. This brought about a slight improvement during the first year of its working, but ways and means of evading its penalties were soon discovered by all concerned, and while farmers—when caught by the Inspectors—were forced to clean their nuts on their way to market, it was still possible for the native trader to adulterate with sand after the nuts had been cleaned and purchased. In this way he increased his tonnage, with the result that upon arrival of the nuts at the transit stations for export they were found to be still heavily adulterated and the Inspectors were denounced as useless.

Compulsory Screening.

After every effort had failed to make the Produce Inspection Ordinance effective owing to the various conflicting interests, I finally recommended that all nuts should be passed through a rotary screen at the time of purchase. Such screen to conform to a specification prepared and submitted by me with the approval of the Government. This suggestion was at first reluctantly accepted by the Bathurst Chamber of Commerce, but their enthusiasm grew as its advantages became apparent. An Ordinance to amend the Law Relating to the Adulteration of Produce, No. 6 of 1924, making compulsory the screening of all nuts purchased or stored for export became operative on June 6.

The thanks of this Department are due to the Directors of the European firms operating in the Gambia for their ready and willing co-operation in providing the necessary rotary screens. Their willing and unhesitating manner in giving effect to these proposals, which involved them in additional heavy expenditure at a very critical period, is greatly appreciated and proves that their co-operation will not be withheld when serious efforts are made to place the trade of the Gambia on a more sound economic footing.

The farmers on their part have taken readily to the screening. The slight delay at the buying station is preferred to the persecution caused by a native Produce Inspector suddenly appearing in the middle of a long, tiresome journey, and demanding that the donkeys be unloaded and the nuts turned out on the road for inspection. Such procedure was calculated to damp the ardour of the most enthusiastic grower of groundnuts.

The spacing of the bars in the barrel of the screen is such that the majority of the shrivelled or immature nuts are eliminated with the sand and other extraneous matter.

Three hundred and forty-seven rotary screens are now operating in the Gambia.

Concrete or Crinting Covered Floors.

It is obviously a waste of energy, time, and money if nuts that have been carefully screened are to be placed upon loose sand to await the ocean-going steamers. In some instances firms have laid down permanent concrete floors for the reception of their nuts, and others have provided grass or bamboo mats.

The result in either case proved so satisfactory that all firms were invited to adopt similar measures. While the majority of firms promptly adopted the suggestion, others strongly opposed it. The mental attitude of the opposition was disclosed by the argument that two per cent. adulteration was permitted by the European market, and if the nuts were shipped too clean this money would be lost! Comment is needless.

I am informed upon good authority that the cost of supplying grass mats in actual practice is £1 per station.

Within a short distance of where I am writing, a steamer is now loading for Europe from a stack of nuts which have been carefully screened. The nuts—a stack of over a thousand tons—are as clean as one could wish for, yet they have been stored upon loose sand, and when I arrived in the yard two natives were busily engaged in sweeping the sand and scattered nuts upon the heap, while the loaders were shovelling from the ground sand and nuts into the bags for loading. Consignees will not be able to complain of loss due to the absence of sand in this cargo, unless my arrival luckily coincided with the commencement of the adulteration.

REDUCTION OF BUYING STATIONS.

During the season 1923-24 there were seventy-five buying centres scattered throughout the Protectorate, and at some of these centres an individual firm established a large number of buying stations within a small area. This ruinous competition considerably increased working expenses and tended to reduce the price paid to farmers for their nuts.

There are nine firms engaged in the groundnut industry in the Gambia, and yet in one district alone no less than forty-seven buying scales were established along a frontage of half-a-mile.

It was quite impossible to find sufficient trustworthy and qualified native traders for such a number of stations, and, in consequence, very considerable losses occurred. Shortages in cash and tonnage were a conspicuous feature of the 1923-24 season.

The advent of compulsory screening afforded a good opportunity for adjusting and reducing the number of buying stations in each Province. While it is admitted that in some few instances this reduction has somewhat increased the distances between farm and market, nevertheless the reduction is to the general good of the Colony as a whole.

By such reduction it has been possible to eliminate defaulting traders and their annual losses. It has meant a saving in working expenses which will probably more than compensate for the initial cost of the screens. I do not believe that any material quantity of nuts have been lost through the reduction of buying stations, and the actual profits should show a more satisfactory margin than for the previous season.

Our main buying centres at wharf towns along the river, where considerable expenditure has been incurred in erecting substantial business premises, were fast becoming deserted owing to the trade being diverted to wayside creeks where little or no control could be maintained.

Sixty-three buying centres were maintained during the 1924-25 crop as follows :—

Upper River Stations.	MacCarthy Island Stations.	South Bank Stations.
Koina.	Sammeh.	Kossemar.
Fattoto.	Karantaba.	Banatenda.
Peri.	MacCarthy.	Chagell.
Fattatenda.	Kuntaur.	Bansang.
Findifetto.	Nianimaro.	Sappo.
Medina.	Carrol's Wharf.	Walli Kunda.
Basse.	Kaour.	Patchar.
Darsilame.	Ballanghar.	Kudang.
Kanube.	Panchang.	Gissady.
Diabugu.		Sempang.
Alimaka.		Pakali.
Dembawando.		Sutukung.
		Jassong.
		Tendaba.

Loading groundnuts at Kuntaur Wharf.

Screening groundnuts.

North Bank Stations.	Kombo and Foni Stations.
Kani Kunda.	*Kombo.*
Sarra Kunda.	Gungur.
Ballingho.	Brufut.
Beretto.	Mandinari.
Jirung.	Sukuta.
Katchang.	Kembuji.
Salikene.	Demban.
Jawara.	Sarakunda.
Memme.	*Foni.*
Albreda.	Sintet.
Bakkendick.	Jarrol.
Berending.	Bondalli.
Ker-Sanian.	Sibanor.
	Bwiam.
	Tuba-kolong.
	Bathurst.

Taking the average crop at 60,000 tons, and allowing for each firm to be represented at every centre, this reduces the buying to approximately one hundred tons for each firm per centre. No justification can be made under the circumstances for increasing the number of these centres. The fewer the centres within reasonable limits, the better the control which can be maintained in protecting the buyer from adulterated produce.

CHIEF AGRICULTURAL EXPORTS.

Groundnuts.

It must be remembered that the groundnut crop is grown each year between the months of June to October. Reaping operations are conducted in November, and the buying season opens on December 1st. The crop, however, is not actually exported until early in the following year.

It will be convenient, and serve a more practical purpose, therefore, if we disregard the actual date of shipment and deal with the crop in the year in which it is grown. Otherwise any observations relating to it, or any suggestions made for its improvement, would be twelve months old before appearing in print, and would therefore be robbed of any practical value.

The nuts grown during the year under review (1924) show a marked improvement over the 1923 crop.

The following extract of a letter received from the Directors of a firm trading in the Gambia is of interest in this respect :—

> " As to the nuts of the Gambia they give this year every satisfaction, and the difference of price with the Senegal nuts, which was formerly 10s. per ton, has been reduced to 5s., and people are speaking of reducing it to 2s. 6d. only."

Official Report from the Imperial Institute.

Commercial samples of nuts were taken from buying stations throughout the Protectorate a few weeks after the buying season had commenced. These were mixed together and forwarded to the Imperial Institute for technical report together with another sample collected in a similar way by the President of the Chamber of Commerce. These samples, which fairly

represented the early shipments of the 1924-25 crop, were examined with the following results :—

	Sample No. 1.	Sample No. 2.
Husks in nuts	27	26
Kernels in nuts	73	74
Moisture in kernels	5·9	5·3
Oil in kernels as received	48·9	50·0
Oil in moisture free kernels	52·0	52·8
Acid value of oil	3·6	2·39
Corresponding to :—		
Free fatty acids (expressed as oleic acid) per cent.	1·59	1·20

The foreign matter—stones, sticks and sands—which reached 17·53 per cent. in 1915 has been reduced by compulsory screening to almost vanishing point during the first year.

The following comparative details taken from two account sales received by one of the leading firms operating in the Gambia speak for themselves :—

	Crop, 1923. %	Crop, 1924. %
Dust (sand)	1·447	0·267
Foreign substance	1·491	0·658
Empty shells	1·629	0·520
Bad or damaged nuts	2·626	none
	7·193	1·445

The F.F.A. content, which averaged 4·75 per cent. in 1923, and which reached as high as 12½ per cent., has been reduced to 1·20 per cent. The quality of the 1923 crop was exceedingly poor and contained a large percentage of diseased nuts due to an abnormal excess of rain. The 1924 crop, which has proved so superior, was raised entirely from seed saved from the poor crop of 1923, *but it was carefully selected.*

A demand was made by the Chamber of Commerce for the introduction of fresh seed from Senegal, as they feared that the 1924 crop, if raised from the seed retained from the year previous, would result in a crop of even poorer quality. To have introduced fresh seed from Senegal would have rendered useless the whole of the efforts made by this Department in getting the farmers to select and retain their best seed. They had all been previously told that no fresh seed would be issued, and that they must select their seed as demonstrated to them, the results more than justifying the action of this Department, which was supported by the Government, in opposing the importation and distribution of new seed.

I desire, however, to emphasise the fact that the efforts made by this Department to improve the quality of the groundnut crop are not alone responsible for this satisfactory improvement. These efforts were materially assisted by the favourable climatic conditions prevailing throughout the growing season. Had the abnormal rainfall of the previous season again been experienced, the degree of improvement would not have been so great.

Senegal Seed.

Senegal seed is not suitable for Gambia conditions, and fails to give satisfactory results when grown even under the most favourable conditions in this Colony.

Notwithstanding the fact that Senegal and the Gambia comprise one great territory, the climatic and soil conditions show considerable variation.

It is an interesting fact, and one not generally known, that for a considerable distance along the Senegal side of the boundary between Senegal and Gambia, it is not the "Senegal" variety which is grown, but the "Gambian" variety, as it gives better results. During a recent tour of the Upper River I examined many loads of nuts coming in from French Senegal, and found that eighty-nine per cent. were of the "Gambian" variety, and only eleven per cent. were the small "Senegal" variety.

The best Senegal nuts from Cayor in trials of two-acre plots conducted at the Agricultural Station, alongside plots of the Gambia variety, gave a yield of 1,120 lbs. per acre, as against 2,055 of the Gambia nut.

Several sacks of these special nuts imported from Cayor were distributed free to farmers at Boraba, Sankuli Kunda and Koli Kunda. They were planted and cared for in the usual way, and yielded much below that of the Gambian variety.

The actual yields were as follows:—

Sankuli Kunda	919½ lbs. per acre.
Boraba	1,204 ,, ,,
Koli Kunda	994 ,, ,,

Local farmers are adverse to planting Senegal seed, even when distributed free by the Government. They invariably use such seed for food and prefer to sow that which they had retained from their own raising.

Nigerian and Philippine seed has given good results under our conditions and is appreciated by the native farmer.

Given equal climatic conditions there is not the slightest reason why Gambia nuts should not at least equal those from the best districts of Senegal, and I am confident that the Gambia produce will in the very near future be accepted on the European markets as the standard for groundnut produce, both in purity and in quality. There must, however, be *continuity of policy* and no relaxation in the efforts directed towards progress.

The following table shows the average quantity and value of groundnuts exported for the two decades, 1900-10 and 1911-20, with the individual figures for the remaining four years to date:—

Year.	Tons.	Value.
		£
1900–10 average	39,000	250,000
1911–20 ,, ...	67,656	836,001
1921	59,175	628,901
1922	64,800	780,889
1923	64,178	864,885
1924	60,622	861,925

Palm Kernels.

The average annual exports of palm kernels for the two decades, 1900-10 and 1911-20, with the individual figures for the last four years, are as follows:—

Year.	Tons.	Value.
		£
1900–10 average	255	2,260
1911–20 ,, ...	517	9,083
1921	302	4,478
1922	450	5,731
1923	392	5,640
1924	678	10,571

The best kernels come from the Gungur district, but even these are much inferior to the kernels exported from other West African Colonies.

The oil palm is valued chiefly by the native for palm wine production, and the disastrous results of over-tapping are to be seen throughout the Protectorate.

The young palms are being destroyed by bush fires, and the mature palms are being exterminated by over-tapping. The result is not difficult to see, and unless prompt action is taken palm kernels will—as in the case of rubber—cease to appear in the exports.

A number of palms are being raised from special seed of the "Sombo" variety received from the Imperial Institute, and these will be planted out in trial plots with a view to establishing plantations later on.

A Produce Inspector is specially employed on the inspection of palm kernels as they are brought into Bathurst in small quantities. During the year under review 8,805 bags and 7,558 baskets of kernels were inspected during transit to Bathurst.

Castor Oil Seed.

Some attention is being paid to the cultivation of castor beans which are suited to local conditions. Samples of the local variety were submitted to the Imperial Institute, who reported favourably upon them and considered them to be equal in value to seed from Bombay, the price then being £21 15s. per ton in Hull.

A quantity of Madras and Bombay seed was obtained from Kew and thrived well, producing heavy crops under cultivation at the Agricultural Station. A sample has been forwarded to the Imperial Institute for comparison and report.

Bambarra Groundnut (Voandzeia subterranea).

This nut is grown fairly extensively in some parts of the Protectorate and is a useful food crop. Two varieties are met with—a black seeded and a red seeded variety. It somewhat resembles the groundnut and requires the same treatment. The nuts are cooked in their green state, and if allowed to dry are pounded before cooking.

INVESTIGATIONS IN CONNECTION WITH ESTABLISHING A LIME-JUICE INDUSTRY.

The lime tree (Citrus medica, var. acida), which is grown extensively in the West Indies as a source of citric acid, is to be found growing under semi-wild conditions in many Provinces of the Protectorate.

In view of the fact that prolonged droughts, extending from November to June, are experienced, it is a matter of some surprise that these trees should remain in such vigorous health and be capable of bearing profitable crops under such dry conditions.

Under West Indian conditions—which is the headquarters of the lime-juice industry—lime trees very soon show ill-effects if subjected to prolonged periods of drought.

In the Gambia, these ill-effects, such as wilting and eventual defoliation, are not evident, although the annual droughts are of much longer duration than in the West Indies. It would appear, therefore, that the physical condition of our soils is more suited to the successful cultivation of the lime than are many of the soils now being used for the purpose in the coastal regions of some of the West Indian islands.

Speaking generally, the soils of the Gambia are deep, sandy loams, and owing to their low percentage of clay, soil-shrinkage and subsequent cracking of the surface seldom occurs, and soil moisture is better retained.

It is not always wise, from an Imperial point of view, to urge the development of a new industry in a Colony when the market is already fully supplied from another part of the Empire.

Over-production of a commodity is unprofitable, and reacts adversely on the older established producing centres. This is strikingly instanced in the case of the over-production of cacao in the Gold Coast. This has had a very depressing effect on the cacao industry of the West Indies.

When the normal supply of a commercial commodity is, however, threatened with a serious reduction due to uncontrollable causes, it is essential that attention be paid to the opening up of new producing areas, so that Imperial requirements may be met.

Dominica has for many years past supplied the bulk of lime juice, and lime products required by the trade; her annual exports in this connection have exceeded £170,000.

During the last year or so many of the lime plantations in the West Indies have, unfortunately, become seriously infected with "Wither Tip" disease (Colletotrichum limetticolum, Clausen). This disease is now firmly established in the lime-growing areas of Florida, Porto Rico, Cuba, Dominica, Trinidad and Demerara, and is causing a considerable reduction in the output. In some cases the loss of crop is estimated as high as 90 per cent.

In view of these facts, it is of vital interest to the trade that new productive areas be found and established as quickly as possible.

This matter has received special attention by this Department during the period under review, and so far as soil and climatic condition are concerned, I see no reason why a profitable lime-juice industry should not, in the near future, be established in the Gambia. The rainfall is admittedly on the low side, but the texture of our soil provides a certain amount of compensation, as they retain soil moisture to a greater extent than many of the lime-growing areas in the West Indies.

Samples of ripe fruit grown in various districts were obtained and examined by this Department, with the following results :—

Locality Grown.	Average weight of single fruit.	Actual weight of largest fruit.	Diameter.	Number of Seeds.	Juice content.	Citric Acid.
	Oz.	Grams.	Inch.		c.c.	Oz. per gallon.
Abuko	1·9	63·9	1 9/10	8	31	13·55
Bushambala	1·0	35·0	1 3/10	7	18	14·86
Bathurst No. 1	1·6	56·5	1 8/10	12	30	12·59
,, No. 2	1·5	59·0	1 9/10	11	30	12·80
The Convent	2·9	79·8	2	14	37	13·50
Yundam	1·2	42·5	1 7/10	9	23	15·10
Cape St. Mary	2·3	94·5	2 1/10	10	45	13·10
Sukuta	1·6	56·0	1 8/10	4	30	14·22
Brufut	1·8	53·0	1 7/10	6	28	14·56
Bakau	2·3	79·0	2 1/10	13	37	13 10
Means	1·8	61·9	1 8/10	9	30	13·73

Acidity of Gambian Lime Juice.

Fresh lime juice usually contains from 12 to 14 oz. of citric acid per gallon.

From these results, it will be seen that juice rich in citric acid can be produced in this Colony.

Special attention is directed to the high acidity of the juice extracted from limes grown at Yundam, which, upon repeated tests, gave a citric acid content of 15·10 oz. per gallon.

This is the highest acidity test I have made, although having for many years been directly connected with the West Indian lime juice industry. This abnormal acidity is undoubtedly due to the fruit being grown on a non-retentive soil with a low rainfall. Bathurst, which is low-lying and more or less surrounded by water, produces a fruit appreciably poorer in citric acid.

Concentrated Lime Juice.

By far the greater portion of lime juice produced is concentrated by boiling before shipment, and is largely used in dyeing and calico printing.

Through the kindness of the Compagnie Francaise de l'Afrique Occidentale in placing their lime trees at Cape Saint Mary under the control of this Department, it has been possible to carry out a number of investigations and to prepare a commercial sample of concentrated lime juice from the fruit obtained.

This sample compares very favourably with the West Indian product, and is of good quality, testing 109 oz. of citric acid per gallon and giving a sediment test of 9 c.c. in 1,000 c.c. It will be possible to still further reduce this sediment when suitable facilities are provided. The market value of concentrated lime juice for 1924, was approximately £23 per standard pipe of 108 gallons, containing 64 oz. of acid per gallon.

Essential Oils.

Two oils are obtained from the lime "Otto of Limes," worth about 5s. to 6s. per lb., extracted from the rind of the ripe fruit by means of an ecuélle pan and "distilled" oil recovered by distillation from the raw juice previous to concentration, worth from 1s. 3d. to 1s. 6d. per lb. Although it has not yet been possible to make actual tests as to the local yield of these oils, I am of the opinion that they would not be inferior to those obtained in the West Indies.

Effects to Establish the Industry.

A large number of plants are being raised from West Indian seed obtained from a Colony at present free from "Wither Tip" disease. It is proposed to make a free distribution of these plants to farmers for planting in suitable localities under supervision. When these plants commence to bear, it will be necessary for the Government, or for one of the trading firms, to erect and equip a small factory for the manufacture of the various lime products, to ensure a ready local market for the grower.

BATHURST PUBLIC WATER SUPPLY.

Report upon the examination of three samples of water labelled "The Source Stream," "The Sedimentation Tanks," "Taken from Standpipe, Public Works Yard" received from the Director of Public Works.

SAMPLE: THE SOURCE STREAM.

Results of Chemical and Physical Examination.

Colour in 6-in. column.—Faintest brown tint.
Turbidity.—Clear and bright.
Odour.—None.
Reaction.—No acid reaction.
Residue left on evaporation.—Scarcely perceptible. White. Did not char. Not affected by ignition.
Free ammonia.—No evident trace.
Chlorine.—Under four parts per 100,000.
Equivalent of common salt.—6·5 parts per 100,000.
Nitrates.—None.
Nitrates.—None.
Hardness.—Under four degrees.
Lead, zinc, copper and iron.—Each tested for separately, but all absent.
Oxygen absorbed in 15 min. at 100 C.—Under 0·10 part per 100,000.

SAMPLE: THE SEDIMENTATION TANKS.

Results of Chemical and Physical Examination.

Colour in 6-in. column.—Colourless.
Turbidity.—Clear and bright.
Odour.—None.
Reaction.—No acid reaction.
Residue left on evaporation.—Very slight. White. Did not char. Not affected by ignition.
Free ammonia.—0·002 parts per 100,000.
Chlorine.—1·5 parts per 100,000.
Equivalent of common salt.—2·4 parts per 100,000.
Nitrates.—None.
Nitrates.—None.
Hardness.—Four degrees.
Lead, zinc, copper and iron.—Tested for separately, but none present.
Oxygen absorbed in 15 min. at 100 C.—Under 0·10 parts per 100,000.

SAMPLE: TAKEN FROM STANDPIPE PUBLIC WORKS YARD.

Results of Chemical and Physical Examination.

Colour in 6-in. column—Colourless.
Turbidity.—Clear and bright.
Odour.—None.
Reaction.—No acid reaction.
Residue left on evaporation.—Very little. White. Did not char. Not affected by ignition.
Free Ammonia.—0·000 per 100,000.
Chlorine.—2·0 parts per 100,000.
Equivalent of common salt.—3·3 parts per 100,000.
Nitrates.—None.
Nitrates.—None.
Hardness.—Temporary none. Permanent four degrees.
Lead, zinc, copper and iron.—Each tested for separately. None present.
Ogygen absorbed in 15 min. at 100 C.—Under 0·05 part per 100,000.
Oxygen absorbed in four hours at room temperature in dark.—Under 0·05 parts per 100,000.

Opinion.—From the examination of the source of the water referred to, and the results obtained by analysis, I am of opinion that it is well adapted

for all domestic and manufacturing purposes. It is an excellent water for steam raising purposes. Free from metallic impurities and harmful contamination. It is a water of high purity.

Five further samples of water were taken by this Department from Public Stand Pipes in Bathurst, as follows:—Corner of Buckle and Hill Street; Marine Store; Albion Place; Police Lines and Bungalow No. 5. These samples were specially examined for metallic impurities. Very minute traces of iron were found in three samples taken from the Marine Store, Police Lines and Bungalow No. 5.

A sample of water was taken from the rain water storage tank in Bungalow No. 5 for comparison, and it was found to possess six degrees of hardness, as against four degrees of the pipe-borne water. This higher degree of hardness is probably due to the annual liming of the iron storage tanks.

LIVE STOCK.

The question of livestock is a very important factor in the rural economy of an agricultural community, and it demands careful consideration by the authorities. Although it has not yet been possible, owing to pressure of other lines of activity, to commence any practical work with a view to the improvement of livestock generally, nevertheless a good deal of attention has been paid to this subject and observations made throughout the year with the view of submitting definite proposals on this subject.

There is not the slightest doubt that a serious shortage of cattle exists throughout the Colony; the present herds being insufficient for farm requirements as a source of manure, and there is a serious shortage of meat in the public markets. The number of cattle in the Colony is capable of considerable extension.

An outbreak of rinderpest occurred in 1917, when it is estimated that 10,000 cattle died. Since that outbreak the local meat supply has, to some extent, been dependent upon cattle coming in from French territory, but restrictions are said to have been placed upon this trade by the French authorities.

Establishment of a Government Stock Farm.

Much has been done in other Colonies by the establishment of Government stock farms, and similar provision should be made in the Gambia as soon as circumstances will permit.

The land at Abuko which belongs to the Government, and which was formerly used by the Roman Catholic Mission as an agricultural training centre for boys, is admirably suited for the purpose. The land is well drained and lies between the Abuko and Lamin stream. It is therefore provided with an abundant natural water supply. It is within easy distance of Bathurst, being connected by motor roads. The existing dwelling house would be suitable for the residence of the officer-in-charge, who should possess some knowledge of practical veterinary practice.

Some years ago an attempt was apparently made to bring about the improvement of cattle by the importation of a number of bulls, but their selection was unfortunate, as they proved too heavy and unsuitable for the purpose.

Attention should be paid to the breeding of cattle, donkeys, sheep, goats, rabbits, and various breeds of poultry.

A number of pedigree animals should be imported for stud purposes, and these should be supplemented by a good number of specially selected animals from the best local herds.

HERBARIUM.

A good deal of plant collecting in the Gambia has been undertaken by visiting botanists from time to time, and this has enabled some idea to be formed as to the existing natural vegetation. As duplicate sets of the plants collected were not left in the Colony, no specimens were available for local reference. The first step towards the formation of a local herbarium has now been taken, and the plants listed below, collected by the writer, form the beginning of what is hoped will eventually become a complete collection of the native and introduced plants known to occur in the Gambia.

Two complete specimens of each plant collected were prepared. One set being presented to the Royal Botanic Gardens, Kew, and the other being retained locally.

I am indebted to the Director of the Royal Botanic Gardens for the naming of the following species :—

Andropogon pseudapricus. Staph.
Cochlospermum tinctorium. R. Rich.
Clerodendron capitatum. Schum.
Clematis hirsuta. G. & P.
Hyptis suaveolens. Poit.
Hyptis spicigera. L.
Loranthus bangwensis. Engl. & Krause.
Lonchocarpus laxiflorus. G. & P.
Oldenlandia grandiflora. Hiern.
Oldenlandia senegalensis. Hiern.
Pennisetum setosum. Rich.
Striga macrantha. Benth.
Striga hermonthica. Benth.
Vernonia nigritana. Oliver & Hiern.
Vernonia pauciflora. Less.
Crotalaria gambica. Taubert.
Ctenium elegans. Kunth.
Daemia extensa. N.E. Br.
Hibiscus asper. Hk.f.
Hygrophila spinosa. T. Ands.
Ipomoea amoena. Choisy.
Lissocheilus purpuratus. Linde.
Merremia pentaphylla. Hall.f.
Perotis latifolia. Ait.
Pterocarpus erinaceus. Poir.
Pandiaka involucrata. Hook.f.
Sphaeranthus senegalensis. DC.
Urena lobata. L.
Vernonia Perrottetii. Sch. Bip.
Waltheria americana. L.

A large number of other plants have been collected and are being prepared.

TREE PLANTING IN BATHURST.

A large number of flowering and shade trees have been raised from seed and planted along the sea-front of Marine Parade, and in the grounds of Government House, and also around the European Compounds.

The following trees have been used for this purpose.

Flowering Trees.

Lagerstroemia flos-reginae ("Queen of Flowers").—One of the most strikingly showy of flowering trees, bearing huge panicles of large bright pink flowers.

Cassia grandis.—This tree bears a profusion of pink inflorescences during the dry season.

Jacaranda mimosæfolia.—An elegant tree, bearing a profusion of blue bell-shaped flowers.

Peltophorum ferrugineum.—A large quick-growing tree, producing erect panicles of sweet-scented rusty-yellow flowers twice a year.

Tecoma spectabilis (" Cloth of Gold ").—Produces a brilliant display of bright yellow flowers when leafless.

Melia azedarach.—" Neem " or " Indian Lilac."

Shade Trees.

Casuarina equisitifolia, Enterolobium Saman and *Albizzia Lebbek.*

LIBRARY.

The formation of a technical library, which received early attention, now contains one hundred and eighty-three volumes of recent standard text-books on the following subjects :—

Chemistry (19). Geology and Soils (4). Mycology (14). Entomology (7). Botany (35). Horticulture (14). Agriculture (24). Live Stock (5). Miscellaneous (61).

The special thanks of this Department are due to Dr. Hill, Director, Royal Botanic Gardens, Kew, for supplying, free of cost, thirty one bound volumes of Kew Bulletin, 1893 to 1922, with general index.

In addition, the following publications have been regularly received :—

Kew Bulletin. Review of applied Mycology. Review of applied Entomology. The Gardeners' Chronicle. Bulletin of the Imperial Institute. Tropical Agriculture. Tropical Life. The Farmers' Express. Farm, Field and Fireside. The Fertilizer. West Africa. The West India Committee Circular.

PLANT AND SEED EXCHANGES, FOREIGN AND LOCAL.

The thanks of the Department are due to the following persons and institutions for contributions of plants and seeds :—

General.

The Royal Botanic Gardens, Kew.

The Imperial Institute, London.

The Agricultural Departments: Ceylon, Nigeria, Gold Coast, Tanganyika, Sierra Leone and Saint Lucia.

The United States Department of Agriculture, Washington.

The Superintendent, The Gardens, La Mortola, Ventimiglia, Italy.

Local.

His Excellency Captain C. H. Armitage.

Mrs. Howie, Mrs. Petersen, Mrs. Webley, Mrs. Sawrey-Cookson, Miss Thompson and the Rev. Father Meehan.

METEOROLOGY.

The meteorological instruments were received in July and the observations were commenced on August 1st.

The following are summaries of the observations recorded for the period commencing August 1st and ending December 31st, 1924.

Barometric Pressure.—The mean pressure at 9 a.m. was 1009·8 mbs.; the highest recorded at this hour being 1015·0 mbs. on October 31st, and the lowest 1006·2 mbs. on August 9th.

The maximum pressure was reached at 2 p.m. December 27th, when 1017·0 mbs. was recorded; the minimum recorded was at 4 a.m. on September 9th, when 1004·0 mbs. was registered.

Wind.—The mean daily velocity of the wind was 3·96 miles per hour, the maximum being 11·46 miles per hour on December 22nd, and the minimum ·49 miles per hour on October 6.

Temperature.—The mean maximum temperature was 83·1° F., and the mean minimum 72·8° F. The extreme maximum, which was 93° F., was recorded on November 9th, and the minimum extreme, which was 59° F., was registered on December 26th.

Elastic Force of Vapour Dew Point and Relative Humidity.—The mean elastic force of vapour was ·676. The mean dew point was 66·7° F., and the mean relative humidity 69.

Rainfall.—The total rainfall measured at the Agricultural Station, Cape Saint Mary, during the five months' period, August 1st to December 31st, was 35·18 inches. No rain fell between January 1st and June 8.

The first light shower for the year 1924 fell on Monday, June 9, followed by a heavy shower on June 14th, which enabled the native farmers to commence preparation of the soil for sowing. Rain fell on 51 days, the greatest fall being 7·13 inches on August 20th, and the lowest ·01 of an inch on July 25th. The greatest fall in an hour was on August 29th, when 1·92 inches were measured between 11 a.m. and 12 noon.

Further meteorological details are given in Appendix I.

Rainfall of Bathurst and the Protectorate.—There is no doubt that the rainfall varies considerably throughout the Protectorate, and it is much regretted that it was not possible to establish recording stations in each of the five Provinces some years ago. Reliable information as to the actual rainfall of each Province would be of considerable help to this Department in determining what crops should be grown, as the degree of productivity of any particular region depends to a very great extent upon its rainfall and distribution.

A recording station was established in Bathurst in 1884, and the returns are complete to date. In 1911, a second station was established at MacCarthy Island, 176 miles up river, but these are the only recording stations for the 4,000 odd square miles of territory. During the year under review a third station has been established with the help of the Commissioner at Basse, in the Upper River Province, 66 miles beyond MacCarthy, and 242 miles from Bathurst. It is hoped that it will be possible to establish other recording stations in the near future.

In 1917, attention was drawn to the "reported decrease of rainfall of the Gambia," and this formed the subject of correspondence between the Government and the Meteorological Society, London. Upon referring to Chart II, which has been prepared from the annual rainfall returns of Bathurst for the last forty-one years, we find that although there is considerable variation in the annual precipitation, yet the mean rainfall for the last three decades is strikingly uniform and does not show any alarming decrease.

Chart II shows the annual variations for the last forty-one years, with the means for the last four decades. The highest annual rainfall recorded for Bathurst was 80·90 inches in 1884; the lowest was 23·68 inches, registered in 1913. The mean average for the last 40 years is 47·08 inches.

The annual figures for the period 1884-1924 are given in Appendix II.

Georgetown Rainfall.

The following table shows the annual rainfall recorded at Georgetown, MacCarthy Island Province, for the last fourteen years :—

Annual Rainfall, Georgetown, 1911 to 1924.

Year.	Inches.	Year.	Inches.
1911	31·94	1918	49·27
1912	34·13	1919	41·53
1913	22·00	1920	40·12
1914	30·41	1921	42·88
1915	35·67	1922	28·51
1916	35·75	1923	36·07
1917	40·91	1924	47·01

The mean average for 14 years is 37·26 inches.

The monthly and annual rainfall recorded at the four recording stations for the year 1924 appears in Appendix III.

CONCLUSION.

In preparing this report I have endeavoured as far as possible to bring together all the reliable information we have bearing upon agricultural matters in the Gambia, and to present it in a popular form so that it might serve as a useful reference to the Travelling Commissioners and members of the Bathurst Chamber of Commerce or other persons interested in the development of the Colony, hoping thereby to obtain their practical support in furthering this development along the progressive lines laid down during the year.

Notwithstanding all the difficulties that have been met and others looming ahead, I am confident that if given the support of all interested parties we may look forward to progress being maintained along sound economic lines.

The birth of a new department is always attended with difficulties, and we have not been an exception in this respect. The first year is always a trying one, as confidence has to be gained before advice is accepted and acted upon. We hope, however, that this period of doubt has now been passed, and that merchants will extend their co-operation to the officers of this Department so that they may be better able to meet the difficulties ahead.

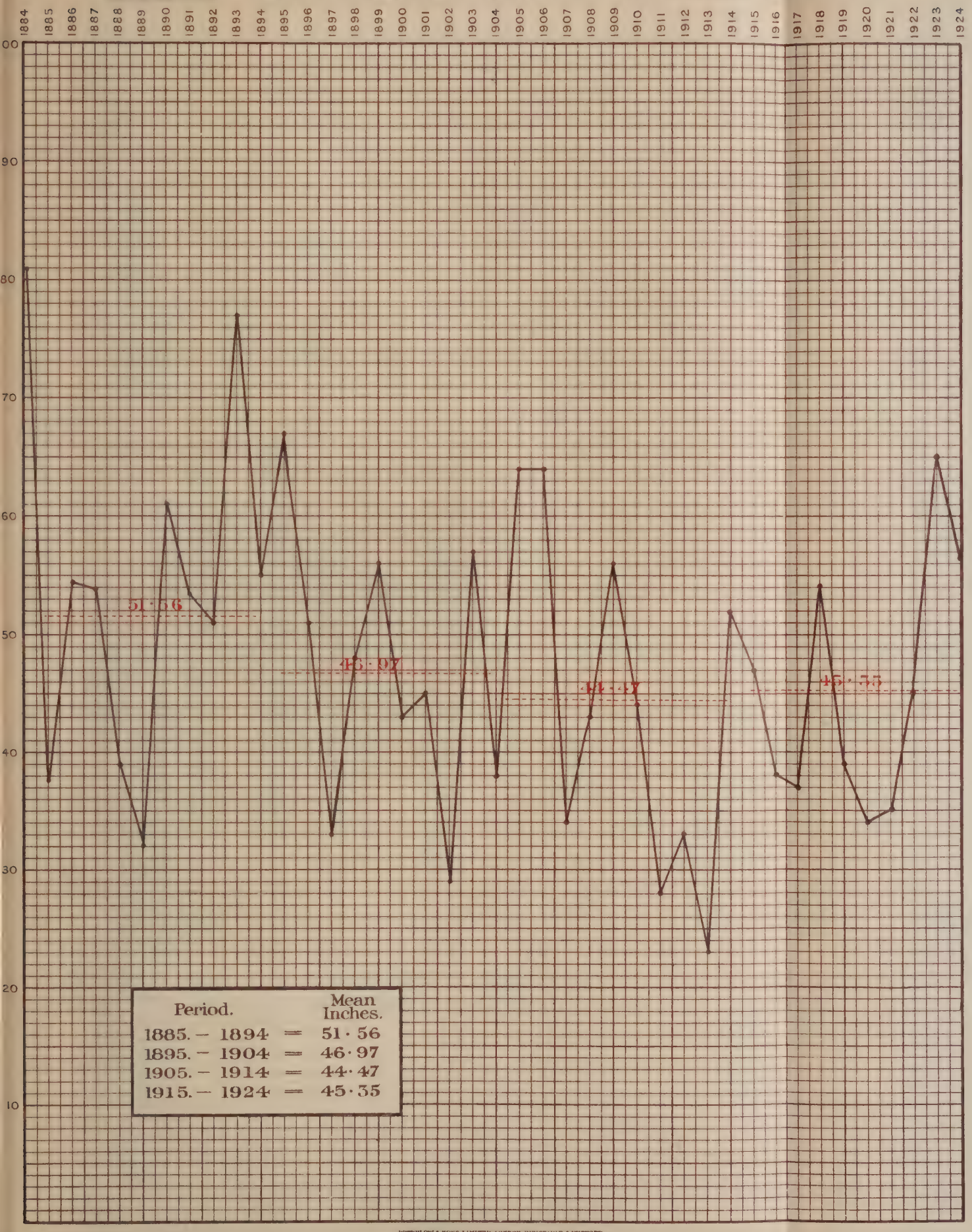
My thanks are due to Dr. A. W. Hill, F.R.S., Director, Royal Botanic Gardens, Kew; Dr. A. K. Marshall, C.M.G., F.R.S., Director, Imperial Bureau of Entomology; Dr. E. J. Butler, C.I.E., Director, Imperial Bureau of Mycology; and to the Director, Imperial Institute, for the material assistance they have gladly rendered this department during its first year of existence.

I desire to record my sincere thanks to His Excellency the Governor, Captain C. H. Armitage, C.M.G., D.S.O., for the wholehearted support which he has given me in the cause of agricultural development, which alone made it possible to achieve the success which has been made during the period under review.

ARCHIBALD J. BROOKS,
Director.

March 30th, 1925.

CHART II.—ANNUAL RAINFALL, BATHURST, THE GAMBIA. 1884–1924.



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APPENDIX I.

Meteorological Report for 1924.

DEPARTMENT OF AGRICULTURE, THE GAMBIA.

Latitude 13° 29′ N.
Longitude 16° 50′ W.

Height above M.S.L. { Barometer 56 feet. / Rain Gauge 45 feet.

Hours of Observation, 9. a.m.

Months.	Mean Barometric Pressure.	Temperatures (Mean).					Dew Point.	Elastic Force of Vapour.	Relative Humidity. (Satn. 100).	Wind Velocity, miles per Hour.	Rainfall.	Number of days on which Rain fell.
		Dry.	Wet.	Max.	Min.	Range.						
	In mbs.	°	°	°	°	°	°				Ins.	
January												
February												
March												
April	Meteorological instruments arrived during July, and the Records were commenced on August 1st.											
May												
June												
July												
August	1008·9	79·1	75·2	83·2	74·7	20	72·3	·793	80	3·61	20·04	21
September	1008·9	81·1	76·1	85·0	74·6	22	72·6	·802	76	2·75	14·17	24
October	1010·2	80·2	74·2	85·2	74·1	20	69·9	·732	71	3·98	·72	3
November	1009·7	78·2	72·2	84·1	74·5	24	67·8	·681	71	3·83	·25	3
December	1011·3	72·1	60·1	79·2	66·9	30	51·0	·374	48	5·66	—	—
Totals	5049·0	390·7	357·8	416·7	364·8	116	333·6	3·382	346	19·83	35·18	51
Means	1009·8	78·1	71·5	83·3	72·9	23	66·7	·676	69	3·96	—	—

APPENDIX II.

Annual Rainfall, Bathurst, for the years 1884-1924.

	Inches.
1884	80·90
1885	37·80
1886	54·16
1887	53·96
1888	39·09
1889	32·06
1890	60·31
1891	53·41
1892	51·13
1893	77·89
1894	55·86
	—— 51·56 average.

	Inches.
1895	66·86
1896	51·18
1897	33·61
1898	48·65
1899	56·17
1900	43·38
1901	45·31
1902	29·42
1903	57·13
1904	38·02
	46·97 average.

	Inches.
1905	64·16
1906	64·33
1907	34·00
1908	43·54
1909	56·59
1910	44·00
1911	28·14
1912	33·99
1913	23·68
1914	52·33
	—— 44·47 average

	Inches.
1915	47·64
1916	38·02
1917	37·68
1918	54·03
1919	39·23
1920	34·29
1921	35·12
1922	45·71
1923	65·38
1924	56·46
	—— 45·35 average.

APPENDIX III.

Rainfall Returns for the Gambia, 1924.

Name of Station.	Jan.	Feb.	Mar.	Apl.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	No. of Days on which rain fell.
Kombo Province—														
Agricultural Station (Cape Saint Mary)	Nil	Nil	Nil	Nil	Nil	(Not recorded)		20·04	14·17	·72	·25	Nil	35·18	51*
Bathurst	Nil	Nil	Nil	Nil	Nil	2·98	13·85	26·14	11·96	·79	·74	Nil	56·46	70
MacCarthy Island Province—														
Georgetown	·62	Nil	Nil	Nil	1·31	10·44	12·14	10·24	11·45	·81	Nil	Nil	47·01	72
Upper River Province—														
Basse	—	—	—	—	—	—	—	From (17 to 31) 11·21	8·64	2·84	·03	Nil	22·72	30†

* Record incomplete, commenced August 1.
† Record incomplete, commenced August 17.

APPENDIX IV.

Table Showing Annual Exports of Groundnuts from 1900 to 1924.

Year.	Tons.	Value.
		£
1900	25,605	221,841
1901	25,750	172,405
1902	31,612	193,486
1903	45,477	275,394
1904	43,436	229,287
1905	29,499	169,426
1906	36,050	278,055
1907	40 858	256,685
1908	31,964	245,084
1909	53,644	323,231
1910	58,456	387,942
1911	47,931	437,472
1912	64,169	502,069
1913	67,404	622,097
1914	66,885	650,461
1915	96,151	400,434
1916	46,366	506,098
1917	74,300	869,790
1918	56,490	800,319
1919	71,677	1,172,843
1920	85,190	2,398,444
1921	59,175	628,901
1922	64,800	780,889
1923	64,178	864,885
1924	60,622	861,925

APPENDIX V.

Average Local Price Paid for Groundnuts for the last twenty-six years.

Trade 1899–1900	Wharf Towns 1s. 6d.	Shipping Towns 1s. 9d.
„ 1900–1901	„ 1s. 6d.	„ 1s. 9d.
„ 1901–1902	„ 2s.	„ 2s. 3d.
„ 1902–1903	„ 1s. 4d., 1s. 2d. ...	„ 1s. 7d., 1s. 2d.
„ 1903–1904	„ 1s.	„ 1s. 3d.
„ 1904–1905	„ 1s. 1d.	„ 1s. 4d.
„ 1905–1906	„ 1s. 3d.	„ 1s. 6d.
„ 1906–1907	„ 1s. 3d.	„ 1s. 6d.
„ 1907–1908	„ 1s. 9d.	„ 2s.
„ 1908–1909	„ 1s. 1d., 1s. 2d. ...	„ 1s. 4d., 1s. 2d.
„ 1909–1910	„ 1s. 4d.	„ 1s. 7d.
„ 1910–1911	„ 2s.	„ 2s. 3d.
„ 1911–1912	„ 1s. 6d.	„ 1s. 9d.
„ 1912–1913	„ 2s.	„ 2s. 3d.
„ 1913–1914	„ 2s. 1d.	„ 2s. 4d.
„ 1914–1915	„ 4d., 1s. 2d	„ 7d., 1s. 2d.
„ 1915–1916	„ 1s. 10d., 1s. 2d. ...	„ 2s. 1d., 1s. 2d.
„ 1916–1917	„ 2s. 4d., 1s. 2d. ...	„ 2s. 7d., 1s. 2d.
„ 1917–1918	„ 2s. 6d.	„ 2s. 9d.
„ 1918–1919	„ 2s. 7d., 1s. 2d. ...	„ 2s. 10d., 1s. 2d.
„ 1919–1920	„ 5s. 3d.	„ 5s. 6d.
„ 1920–1921	„ 2s. 9d.	„ 3s.
„ 1921–1922	„ 2s. 3d.	„ 2s. 6d.
„ 1922–1923	„ 2s. 4d., 1s. 2d. ...	„ 2s. 7d., 1s. 2d.
„ 1923–1924	„ 2s. 5d.	„ 2s. 8d.

Note.—The above prices are only an average for each trading season. For instance, in 1919-1920 as much as 8s. per bushel of 28 lbs. was paid, this being the highest price ever paid in the Gambia.

APPENDIX VI.

Number of Immigrant or "Strange" Farmers entering the Gambia Annually to Plant Groundnuts.

Year.	Number.
1910	—
1911	—
1912	6,525
1913	9,940
1914	14,908
1915	32,220
1916	9,315
1917	20,727
1918	20,509
1919	22,440
1920	24,150
1921	22,048
1922	20,566
1923	17,383
1924	14,188

Waterlow & Sons Limited, London Wall, London